FIG. 1

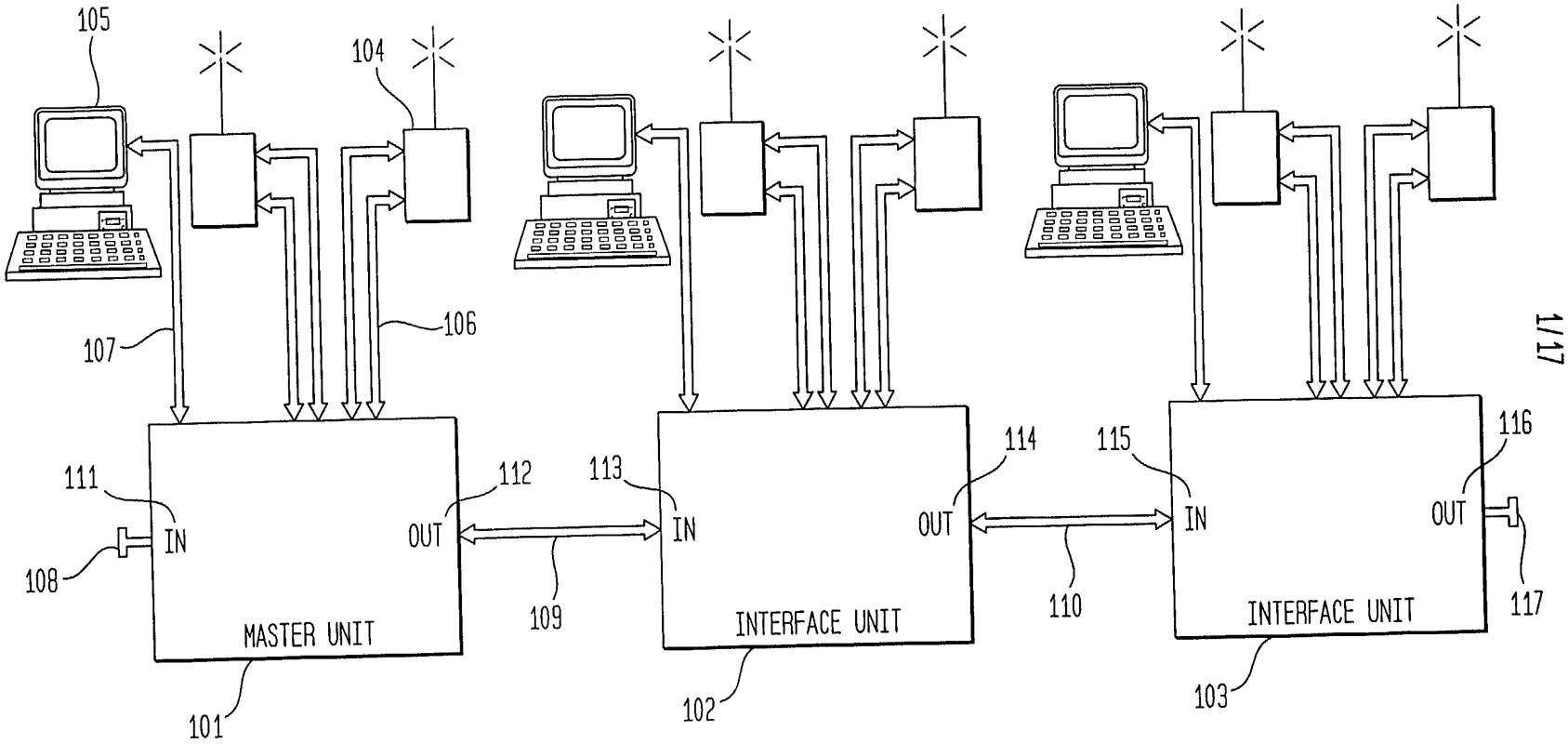
105
104
107
106
111
IN
108
112
OUT
MASTER UNIT
101
109
113
IN
OUT
114
INTERFACE UNIT
102
110
115
IN
OUT
116
INTERFACE UNIT
103
117

FIG. 2

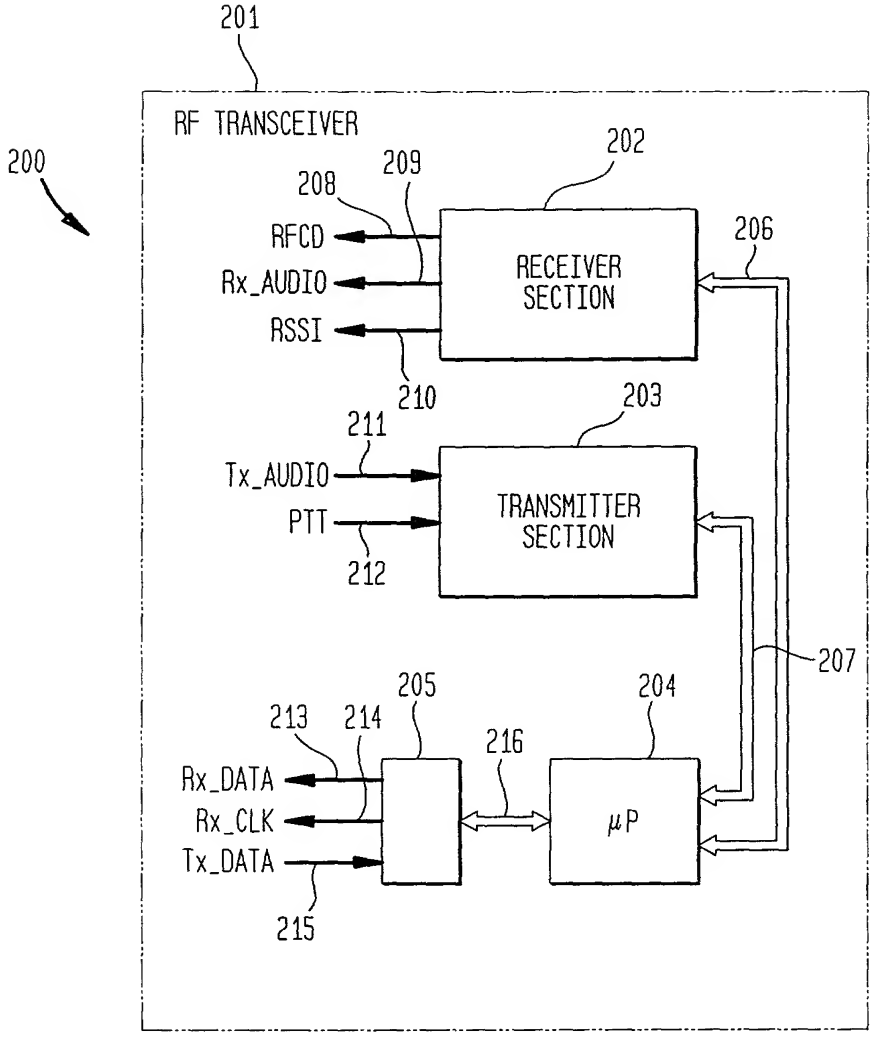
201
RF TRANSCEIVER
200
202
209
208
RFCD
Rx_AUDIO
RSSI
RECEIVER SECTION
206
210
203
211
Tx_AUDIO
PTT
212
TRANSMITTER SECTION
207
205
204
213
214
216
Rx_DATA
Rx_CLK
Tx_DATA
μP
215

FIG. 3

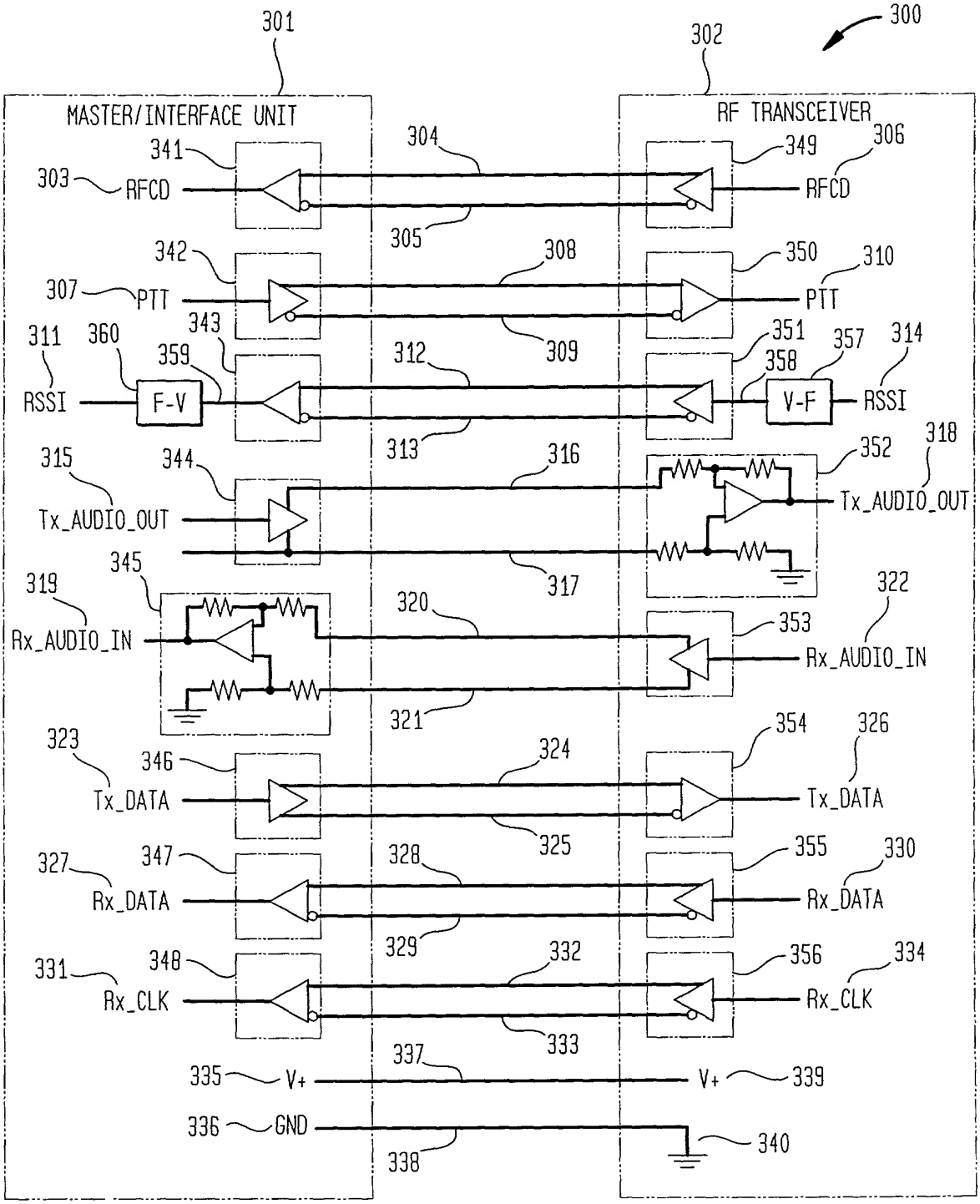

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FIG. 4

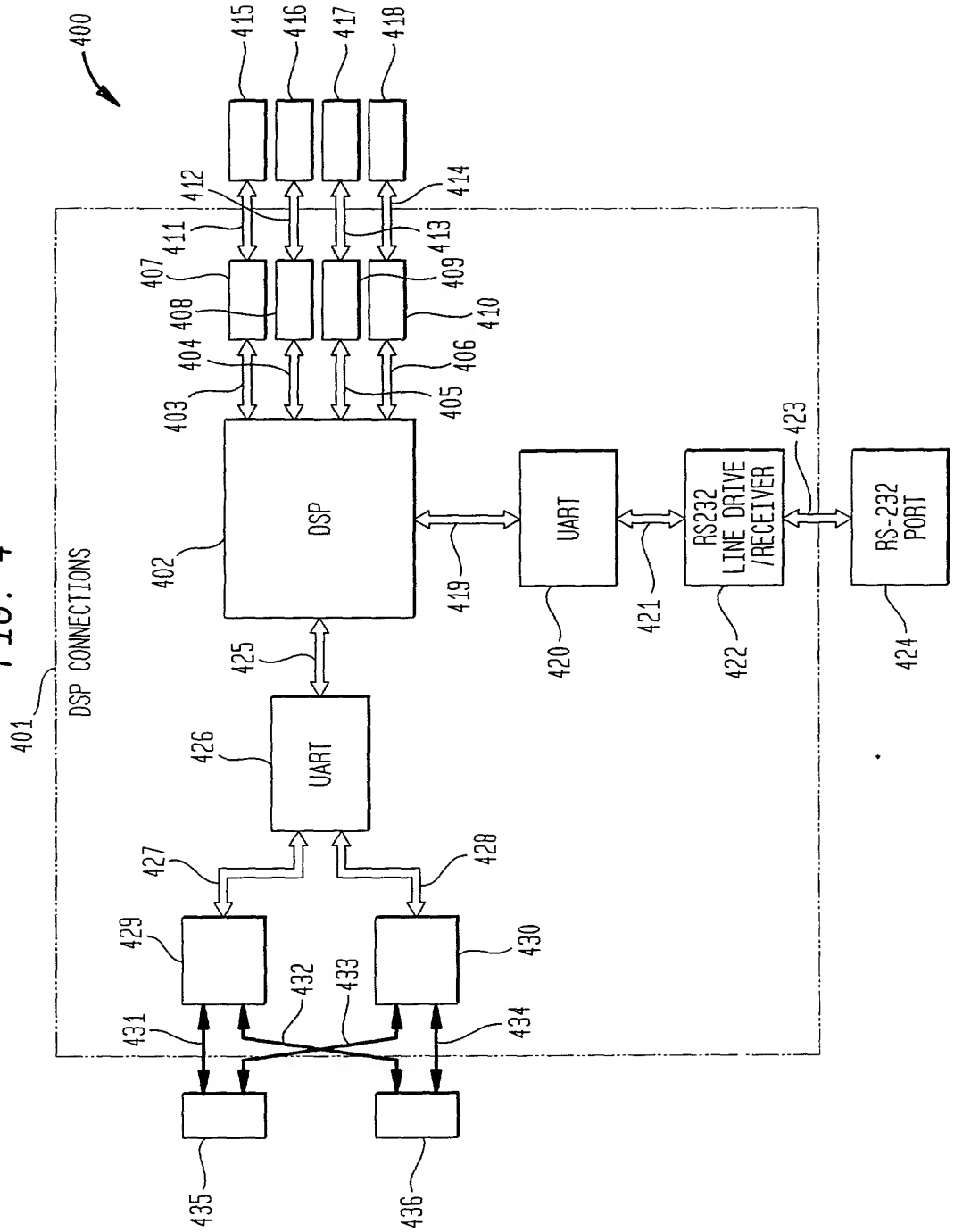


FIG. 5

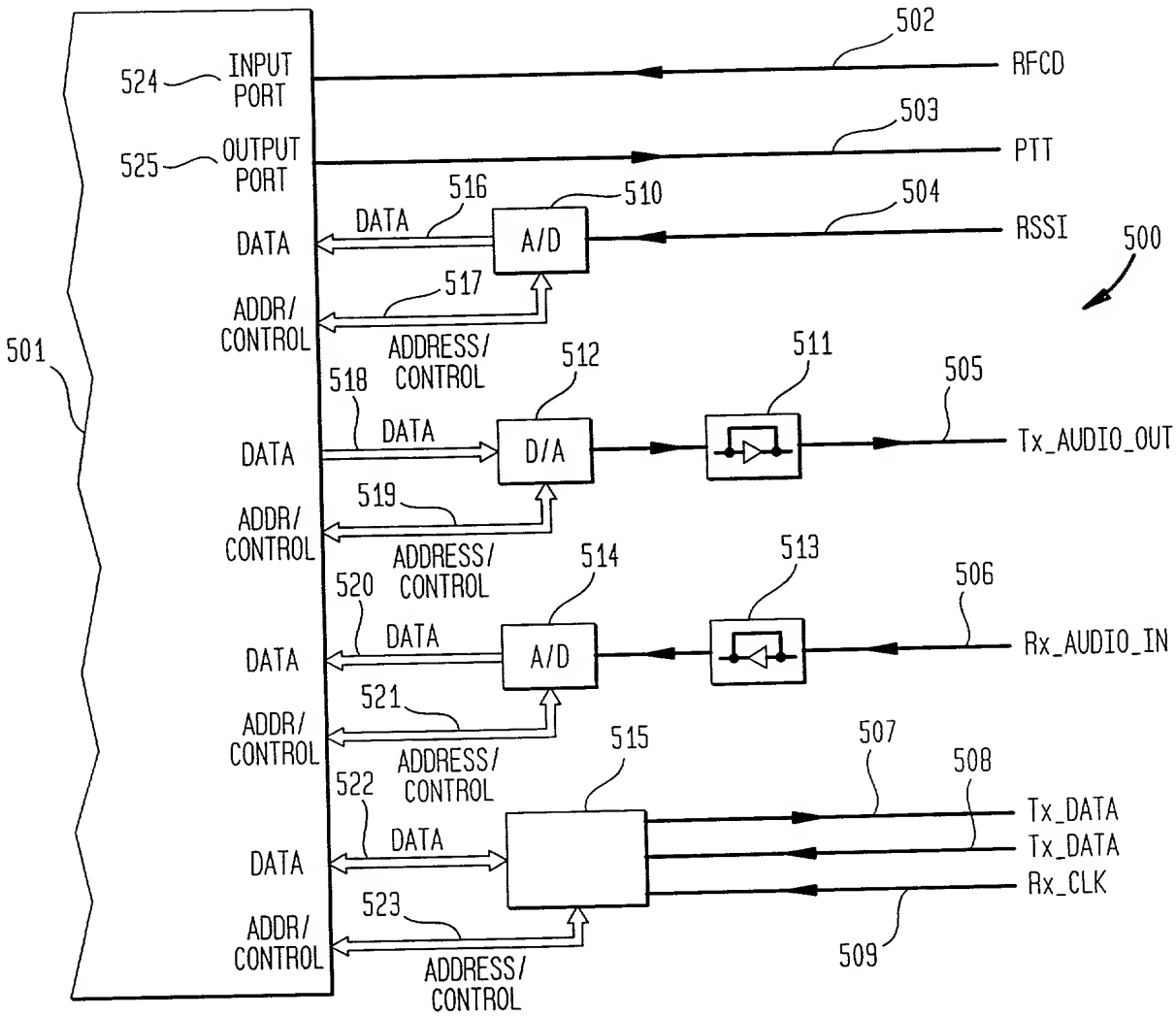
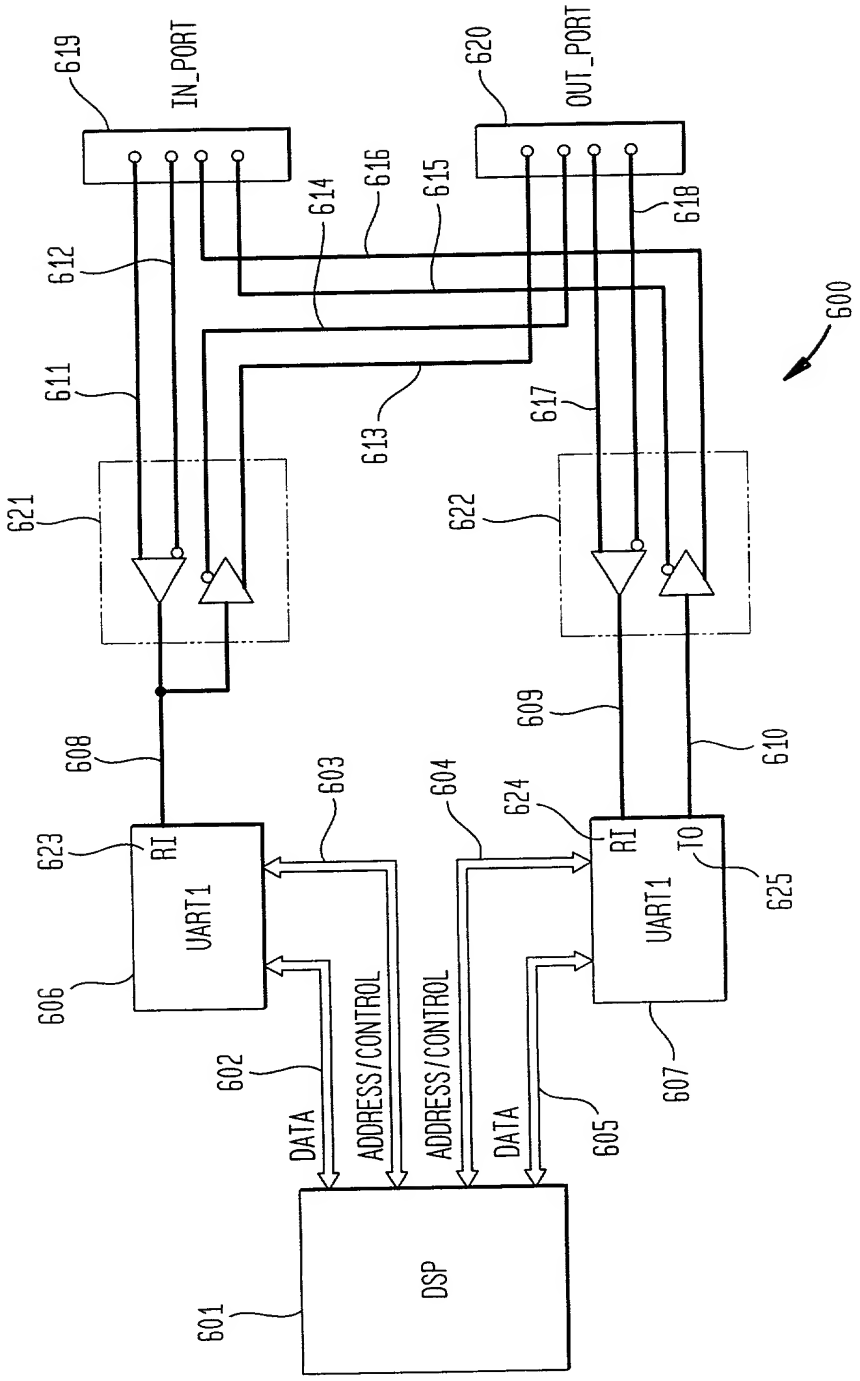

502
RFCD
524
INPUT PORT
503
PTT
525
OUTPUT PORT
516
510
504
DATA
A/D
RSSI
500
DATA
517
ADDR/ CONTROL
501
ADDRESS/ CONTROL
512
511
505
518
DATA
D/A
Tx_AUDIO_OUT
DATA
519
ADDR/ CONTROL
ADDRESS/ CONTROL
514
513
506
520
DATA
A/D
Rx_AUDIO_IN
DATA
521
ADDR/ CONTROL
ADDRESS/ CONTROL
515
507
508
522
Tx_DATA
DATA
Tx_DATA
DATA
Rx_CLK
523
ADDR/ CONTROL
509
ADDRESS/ CONTROL

FIG. 6


600
601
DSP
602
DATA
ADDRESS/CONTROL
603
604
ADDRESS/CONTROL
DATA
605
606
UART1
RI
607
UART1
RI
TO
608
609
610
611
612
613
614
615
616
617
618
619
IN_PORT
620
OUT_PORT
621
622
623
624
625

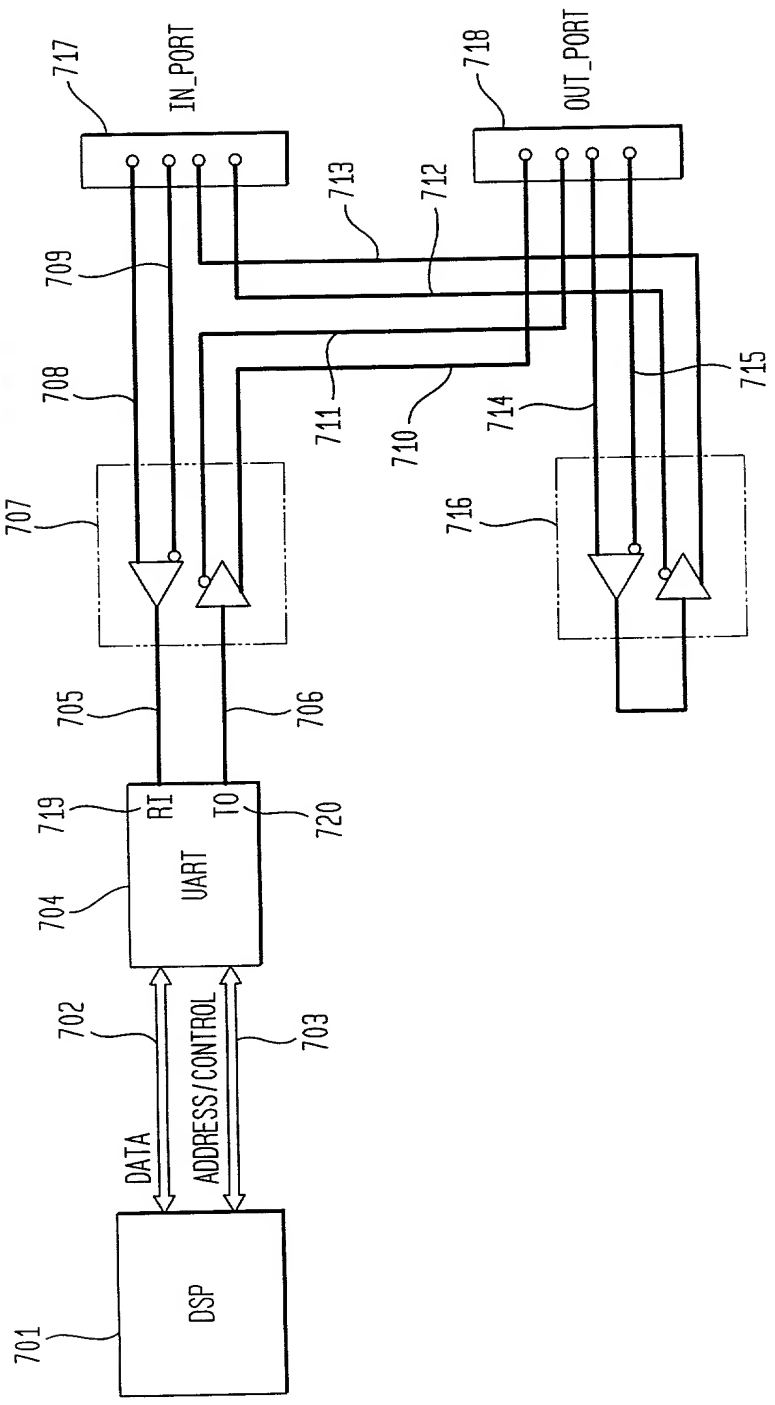


FIG. 7

SELECTED DRAWING

FIG. 8

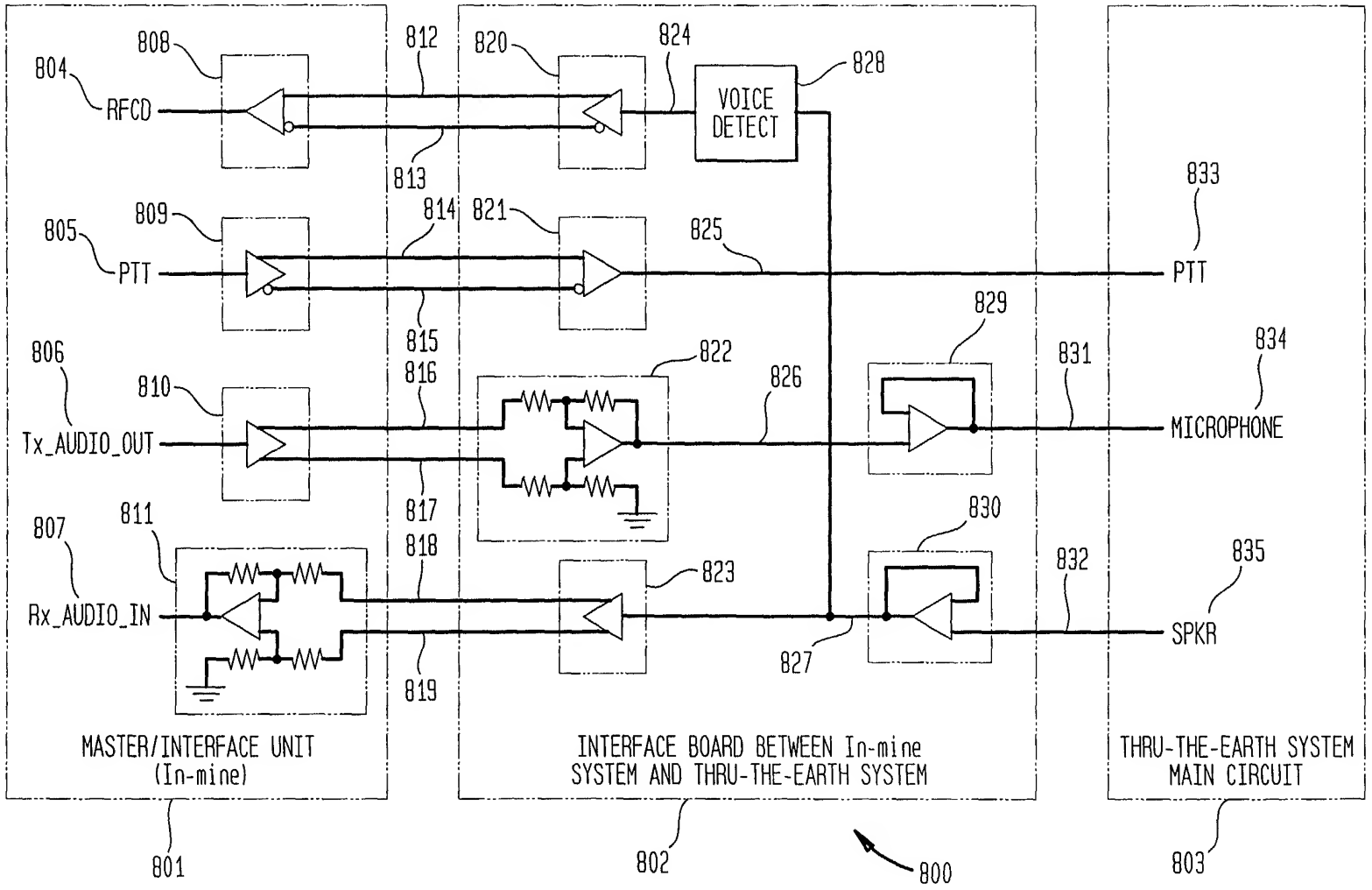

808
804
RFCD
812
820
824
VOICE DETECT
828
813
809
805
PTT
814
821
825
833
PTT
815
829
806
822
831
834
810
816
826
Tx_AUDIO_OUT
MICROPHONE
817
811
830
807
818
832
835
Rx_AUDIO_IN
823
SPKR
827
819
MASTER/INTERFACE UNIT
(In-mine)
INTERFACE BOARD BETWEEN In-mine
SYSTEM AND THRU-THE-EARTH SYSTEM
THRU-THE-EARTH SYSTEM
MAIN CIRCUIT
801
802
800
803

FIG. 9

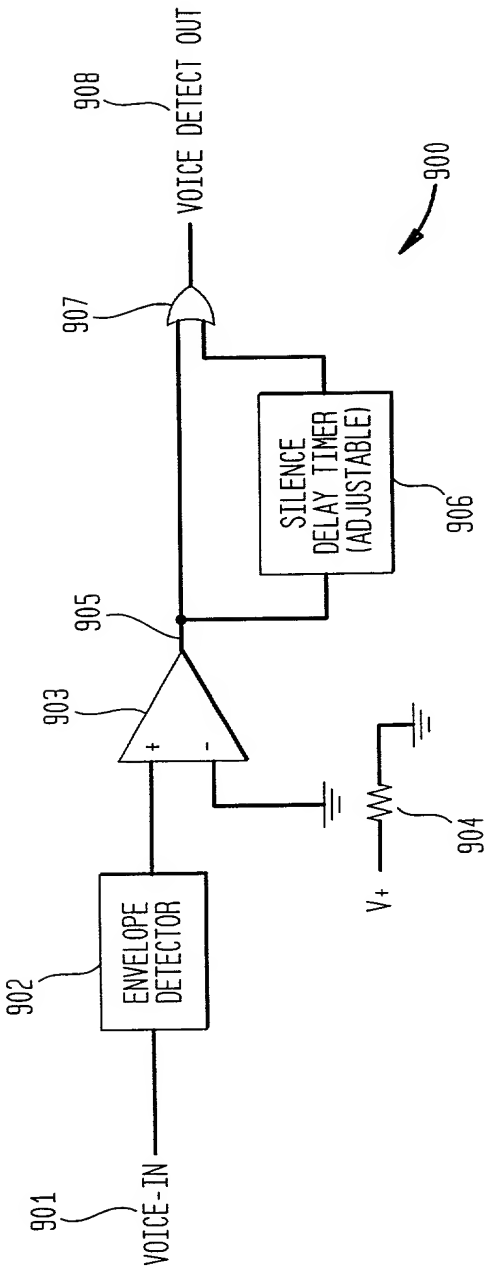

900
901
VOICE-IN
902
ENVELOPE DETECTOR
903
+
-
904
V+
905
906
SILENCE DELAY TIMER (ADJUSTABLE)
907
908
VOICE DETECT OUT

FIG. 10

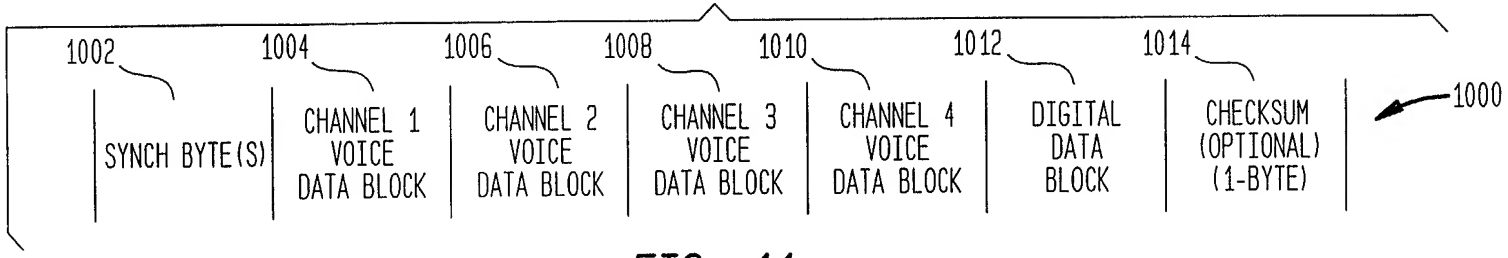


FIG. 11

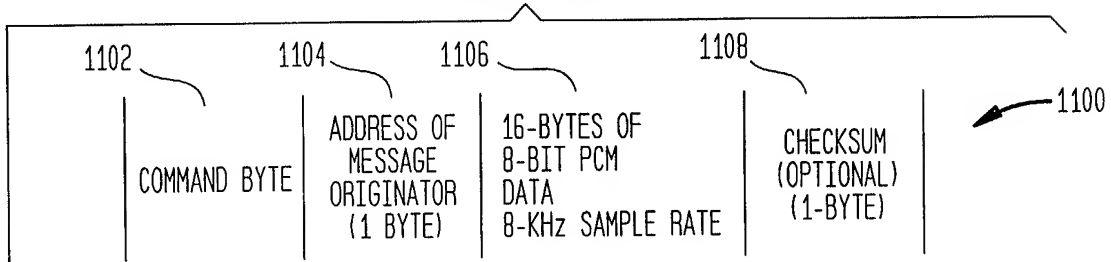


FIG. 12

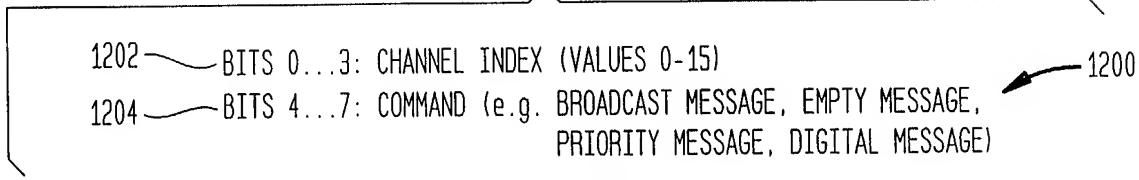


FIG. 13

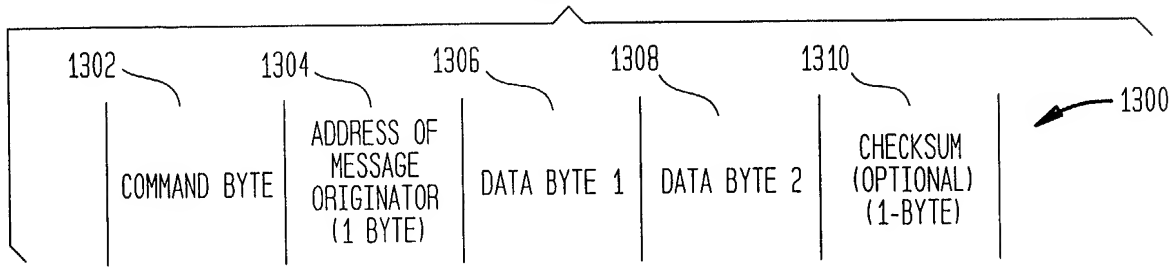


FIG. 14

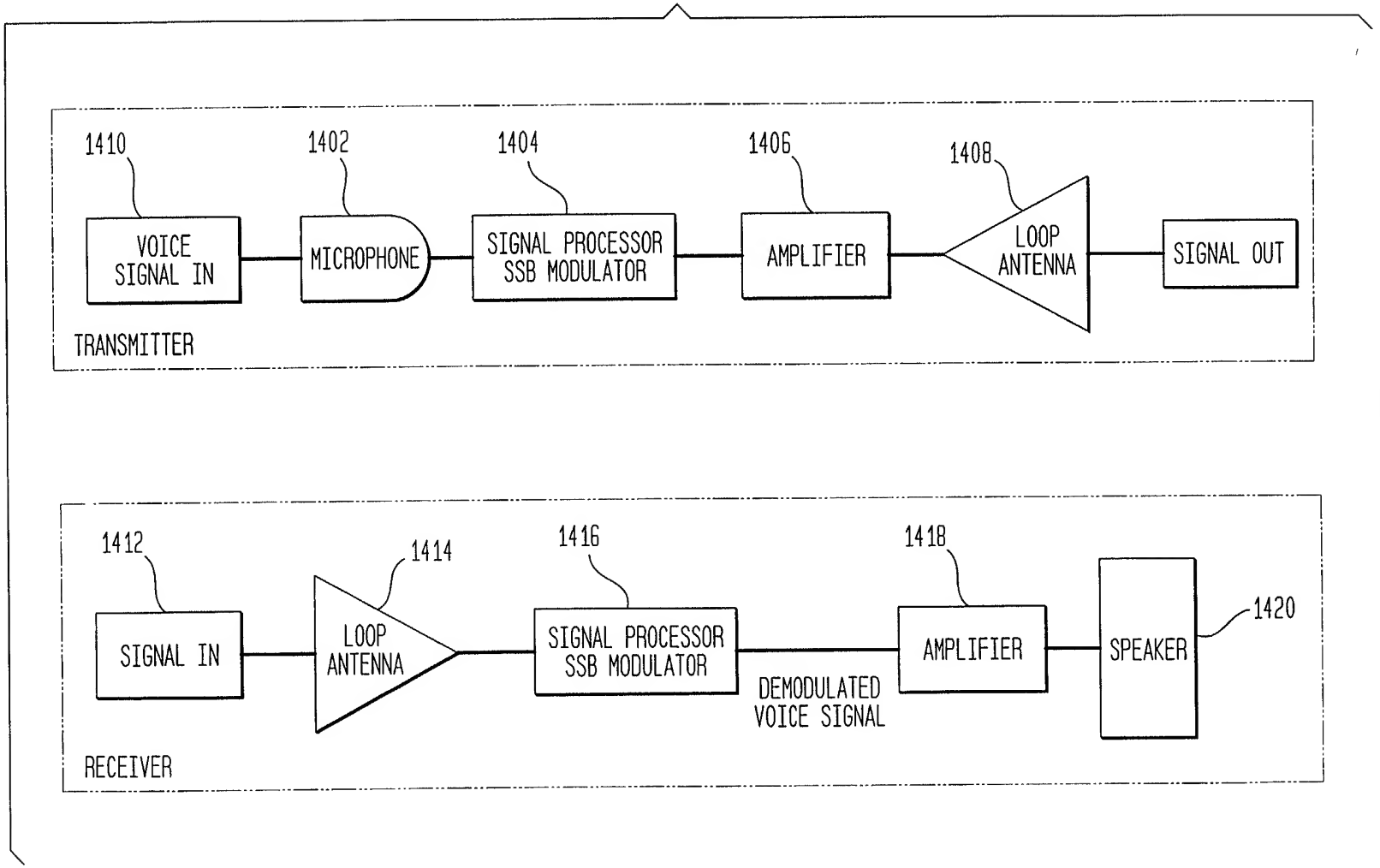

1410
VOICE SIGNAL IN
1402
MICROPHONE
1404
SIGNAL PROCESSOR SSB MODULATOR
1406
AMPLIFIER
1408
LOOP ANTENNA
SIGNAL OUT
TRANSMITTER
1412
SIGNAL IN
1414
LOOP ANTENNA
1416
SIGNAL PROCESSOR SSB MODULATOR
DEMODULATED VOICE SIGNAL
1418
AMPLIFIER
SPEAKER
1420
RECEIVER

FIG. 15

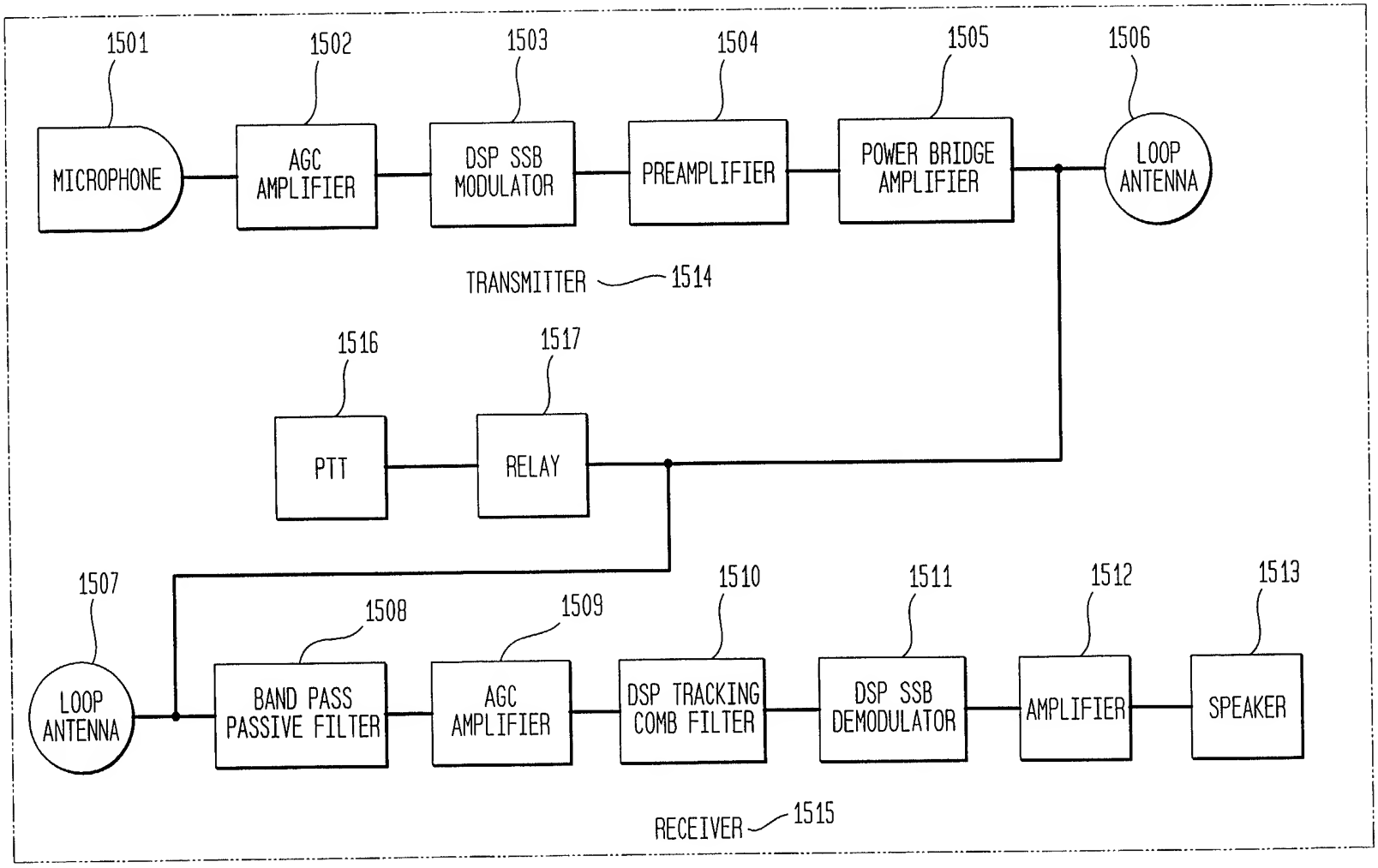

1501
MICROPHONE
1502
AGC AMPLIFIER
1503
DSP SSB MODULATOR
1504
PREAMPLIFIER
1505
POWER BRIDGE AMPLIFIER
1506
LOOP ANTENNA
TRANSMITTER
1514
1516
PTT
1517
RELAY
1507
LOOP ANTENNA
1508
BAND PASS PASSIVE FILTER
1509
AGC AMPLIFIER
1510
DSP TRACKING COMB FILTER
1511
DSP SSB DEMODULATOR
1512
AMPLIFIER
1513
SPEAKER
RECEIVER
1515

FIG. 16

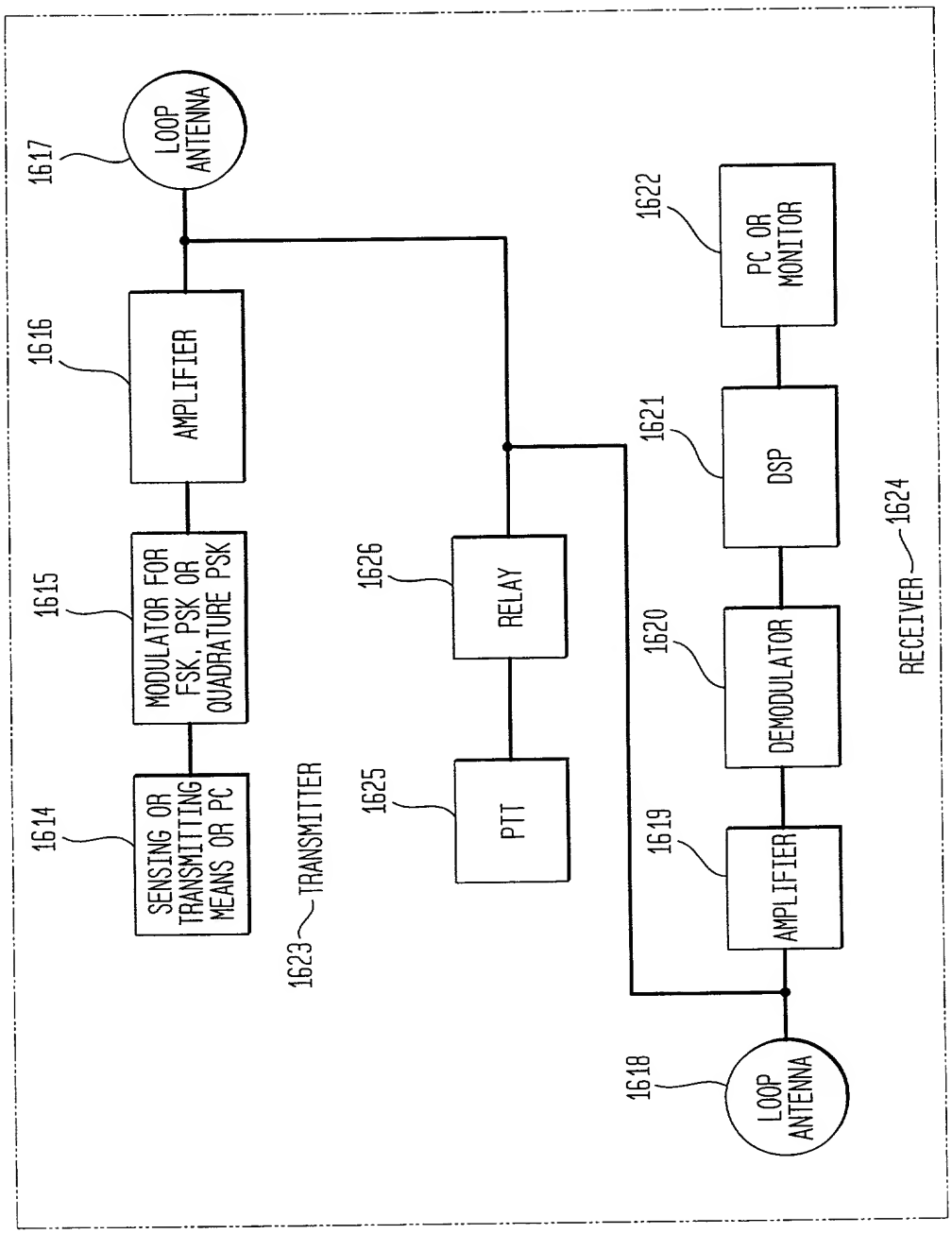
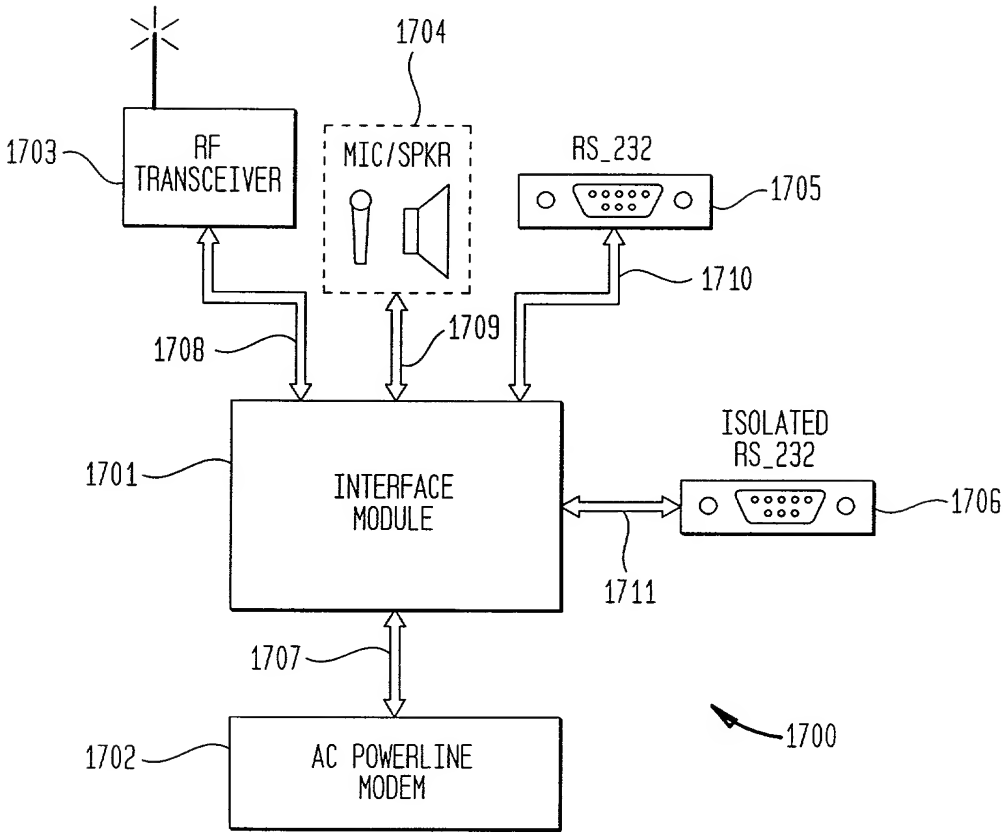

1617
LOOP ANTENNA
1616
AMPLIFIER
1615
MODULATOR FOR FSK, PSK OR QUADRATURE PSK
1614
SENSING OR TRANSMITTING MEANS OR PC
1623
TRANSMITTER
1626
RELAY
1625
PTT
1622
PC OR MONITOR
1621
DSP
1620
DEMODULATOR
1619
AMPLIFIER
1618
LOOP ANTENNA
1624
RECEIVER

FIG. 17



EP 1 376 906 A2

FIG. 18

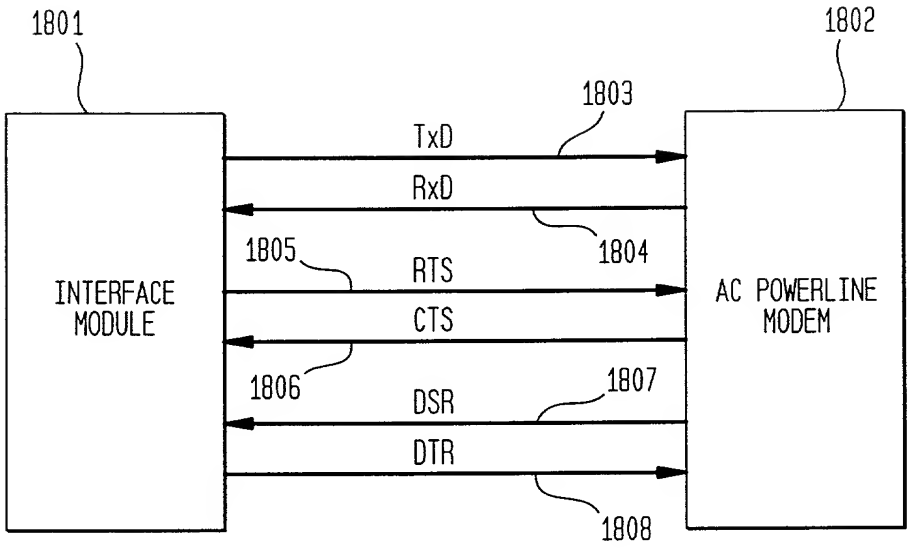

1801
1802
1803
TxD
RxD
1804
1805
RTS
INTERFACE MODULE
AC POWERLINE MODEM
CTS
1806
1807
DSR
DTR
1808

FIG. 19

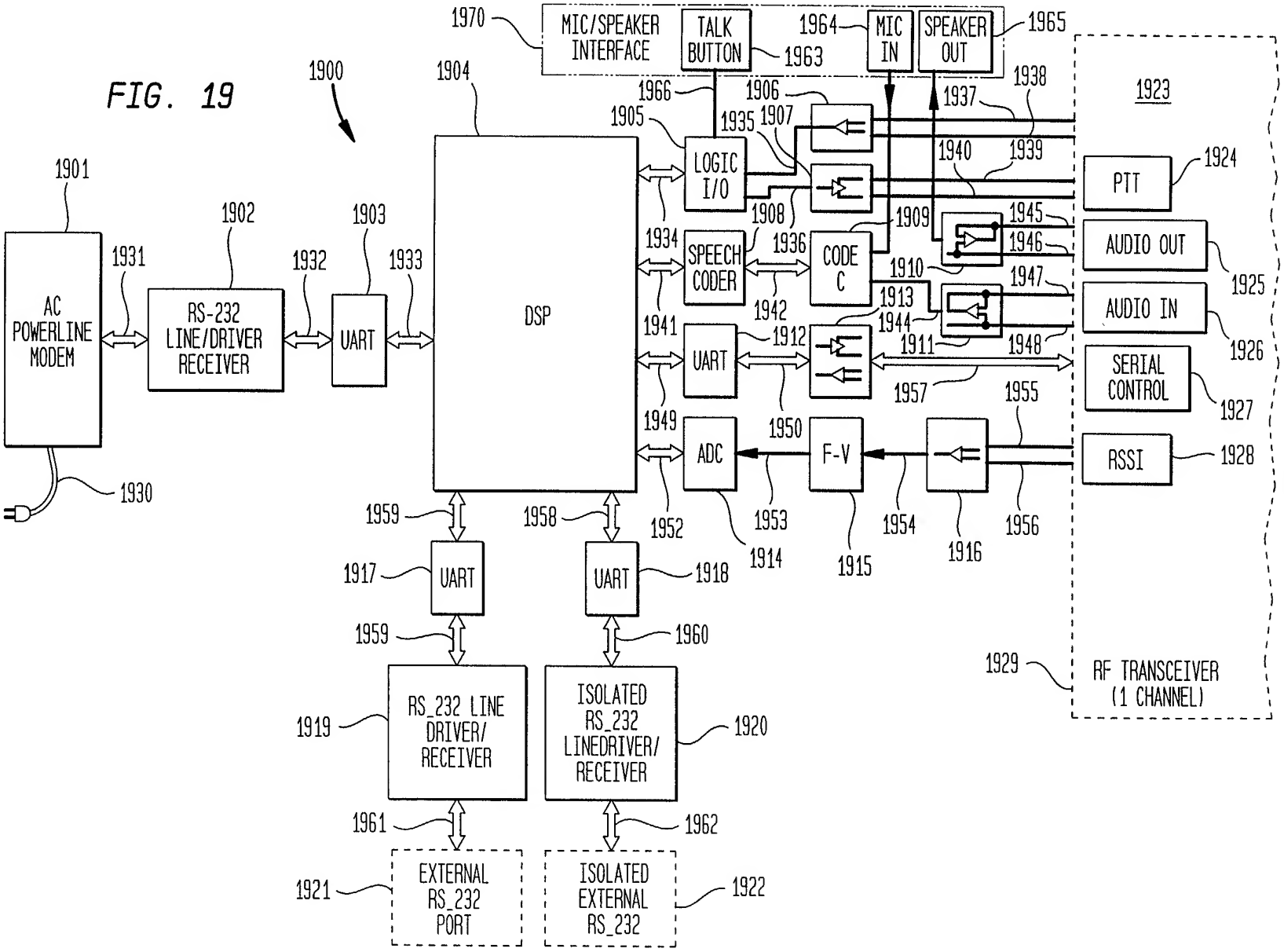

1900
1901
AC POWERLINE MODEM
1930
1931
1902
RS-232 LINE/DRIVER RECEIVER
1932
1903
UART
1933
1904
DSP
1970
MIC/SPEAKER INTERFACE
TALK BUTTON
1963
1964
MIC IN
SPEAKER OUT
1965
1966
1905
LOGIC I/O
1906
1907
1935
1908
1934
SPEECH CODER
1936
CODE C
1909
1910
1941
UART
1912
1942
1913
1944
1911
1948
1957
1949
ADC
1950
F-V
1955
1914
1953
1915
1954
1916
1956
1952
1959
1958
1917
UART
1918
UART
1959
1960
1919
RS_232 LINE DRIVER/ RECEIVER
ISOLATED RS_232 LINEDRIVER/ RECEIVER
1920
1961
1962
1921
EXTERNAL RS_232 PORT
ISOLATED EXTERNAL RS_232
1922
1923
1937
1938
1940
1939
1924
PTT
1945
1946
AUDIO OUT
1925
1947
AUDIO IN
1926
SERIAL CONTROL
1927
RSSI
1928
1929
RF TRANSCEIVER (1 CHANNEL)

FIG. 20

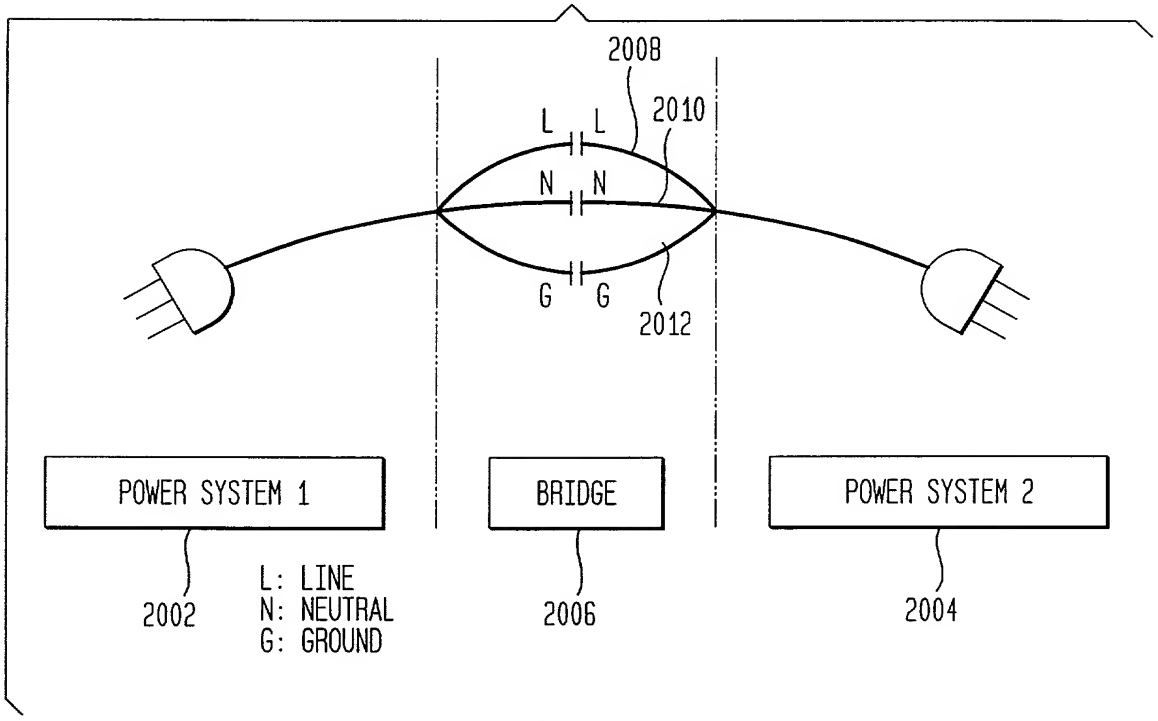
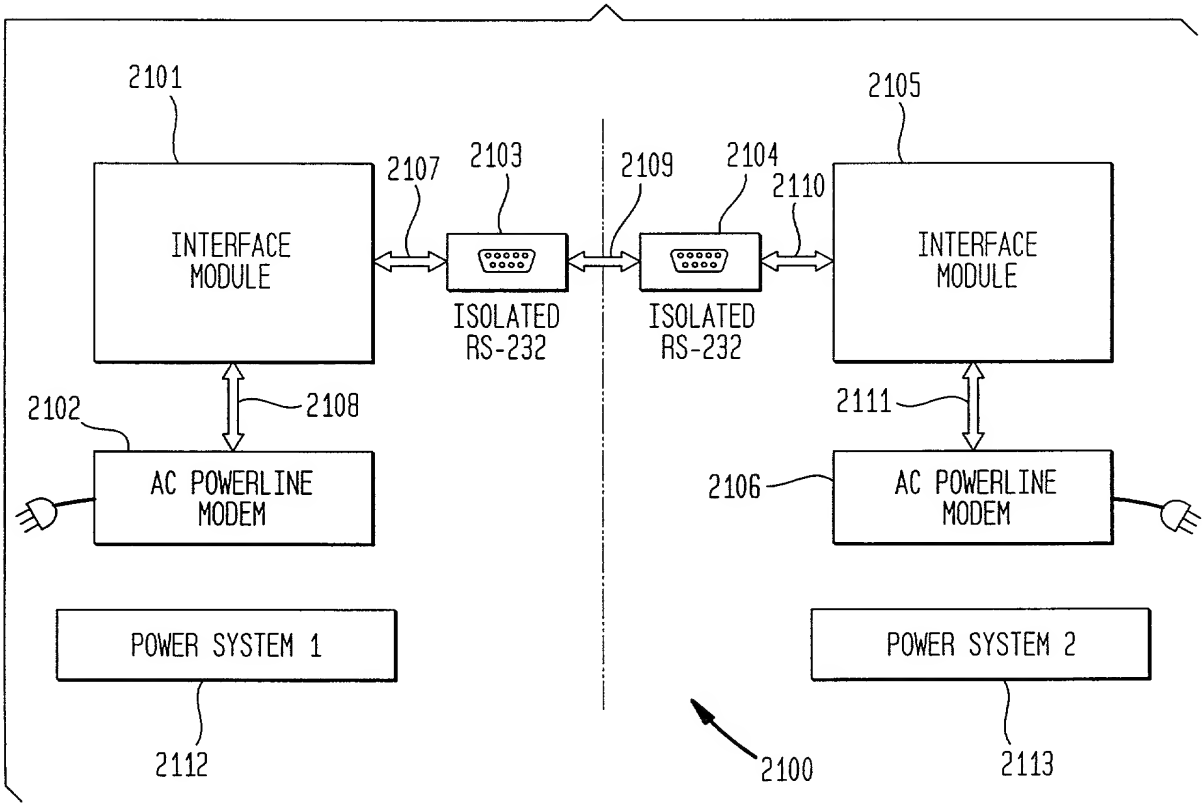


FIG. 21



EP 2 375 595 A1